

Government of India  
Bhabha Atomic Research Centre  
Advanced Fuel Fabrication Facility, Tarapur

Work Order Enquiry

Enquiry No: AFFF/GEN/07/2017/DDES/ 122

DATE: 03/08/2017

**Sub:** - Enquiry for Fabrication, Inspection, Testing and Supply of Tool Sets.

Sealed item rate quotations in the prescribed form are hereby invited on behalf of the President of India by CS, AFFF, Bhabha Atomic Research Centre, Tarapur P.O. Ghivali, Distt: Thane, PIN - 401502 for the following work:

**1. Description of work:**

Fabrication, Inspection, Testing and Supply of Tool Sets.

2. Due date & time: - 28 / 0 8/2017, up to 12:00 hrs.

3. Tender to be submitted at AFFF office BARC tarapur.

4. Tender opening date & time: - 28/ 08/2017 at 15:00 hrs

Interested bidders may please contact the office of

**DDES, Superintendent, AFFF, BARC-Tarapur**

**02525-293340/244165, Fax: 02525-244913**

for detailed technical specifications which shall be issued only in person and shall not be issued by post or courier.

Work order enquiry will be issued against written request by authorized signatory on company letter head. Prospective vendor or his authorized representative shall bring photo identification proof like Passport/ Voter Identity Card/ Driving License/ PAN Card for entry into BARC premises for receiving work order enquiry as well as for submitting the quotation. Prior confirmation on phone shall have to be taken by the bidder so as to arrange entry to BARC Tarapur Complex.

  
R.B. Bhatt

Plant Superintendent, AFFF  
NRB, BARC, Tarapur

28/8/17

## ANNEXURE-I

1. Fabrication, Inspection, Testing and Supply of **Tool sets** of mechanical rotary press for fabrication of annular pellets as per drawing and specifications.

2. **Specification of carbide die and plunger material to be used for fabrication of**

Plungers	- ASTM D2
Core Rods	- HSS, AISI M2 grade
Core Rod adaptors	- ASTM D2
Die body	- ASTM D2
Die sleeve	- Tungsten carbide (WC) – ISO grade K-10

3. **General properties of materials: -**

3.1 **Properties of ASTM D2:**

1. Chemical composition: - C-1.4 to 1.6%, Cr-11 to 13%, Mn < 0.6%, S<0.03%, P<0.03%, V- 0.5 to 1.1%, and Mo-0.7 to 1.2%.

3.2 **Properties of HSS – AISI M2 grade:**

1. Chemical composition: - C-0.95%, Cr-4.2%, Mo-5%, W-6.0%, V-2%, Mn-0.4% & Si-0.4%
2. Bending strength – 4700 MPa
3. Hardness – 65 HRC
4. Impact toughness at high hardness – 0.3 to 0.4 MJ/m<sup>2</sup>
5. Density – 8.16 gm/cc
6. Modulus of elasticity – 190 - 200 GPa

3.3 **Properties of Tungsten Carbide (WC), ISO Grade K-10**

1. Composition – WC – 94.5%, Co – binder – 5%, Tic + TaNbc – 0.5%
2. Density – 14.9 gm/cc (ASTM B311)
3. Hardness – 92 HRA (9 Moh's scale)/ 1800 HV30 (ASTM B-294)
4. Bending / Transverse rupture strength – 2400 MPa (ASTM B-406)
5. Compressive strength – 710000psi
6. Tensile strength – 0.344 GPa
7. Modulus of Elasticity – 550 GPa
8. Poisson's ratio – 0.24

3.4 **Finished components having following hardness:**

1. For plungers : 56 to 58 HRC
2. For core rod : 60 to 65HRC

**Note: -**

1. Heat treatment cycle for plungers of D2( punches)
  - a. Stress relieving at approx. 650 deg C for ½ an hour
  - b. vacuum hardening at approx. 950 to 970 deg C
  - c. gas quenching at 7 bar pressure with Nitrogen
  - d. 3 tempering cycles at approx 480 deg C for 2 ½ hrs each
  - e. Sub Zero Heat Treatment (at - 190° /24 hrs) shall be carried out on punches before last tempering and after first 2 tempering.

*Sml*

- f. Supplier shall submit the hardening process, Coating process, Sub Zero heat treatment process certificate from heat treatment shop.
2. Purchaser's representative shall visit the facility for Heat treatment as well as PVD coating facilities.
3. Plasma Nitriding and Multilayer TiCN coating using PVD techniques shall be carried out on Top and Bottom Punches. PVD coating shall be last stage of production.
4. Before PVD coating, the flat surface of tool tip shall be ground and lapped in order to avoid burr, to maintain the flatness & to achieve VVVV surface finish.
5. Inspection shall be carried out strictly as per drawing at the supplier's site. The instruments required for inspection/metrological checks / hardness / surface finish shall be provided by suppliers at the time of inspection.

#### **4. Inspections and Testing:-**

1. Metrological inspection i.e. dimensional & geometrical check in conformity with the specification.
2. Visual Inspection: - Material shall be free from
  - a) Scratches, Dent & projection.
  - b) Surface crack.
3. Surface finish, tolerances and size shall be strictly maintained as specified.
4. Pull test at a load of 10 kg for one hour shall be conducted on 4 nos. core rods for testing of brazing joint. For testing purpose random samples shall be selected by purchaser. Supplier will submit its report before bulk fabrication. All the samples at the time of inspection should pass the test else entire lot of core rods will be rejected.
5. Material test certificate with respect to chemical composition & physical properties shall be got tested by supplier in govt. approved laboratory & submitted at the time of inspection.

#### **5. ACCEPTANCE:**

After 100% inspection of all the components, visual and dimensional checks, certificate for chemical / mechanical properties, hardness and surface finish as per tender requirement mentioned in the para 2 and 3. The material shall be accepted subjected to compliance of above requirements.

#### **6. PROTOTYPE:**

Prior to bulk fabrication, the contractor shall fabricate one sample and perform all testing and inspection as specified in 2 & 3 above. If necessary, the purchaser may make minor modifications in design at this stage without change in materials specification. All such changes shall be within the scope of the specified work and not considered as extra. The contractor may also suggest modification either to improve the design or to facilitate fabrication. However, acceptance of such changes shall be at the discretion of the purchaser. No modification will be carried out by the contractor without the prior approval of the purchaser.

#### **7. DELIVERY:**

After satisfactory completion and inspection, all material shall be suitably packed and delivered at AFFF Stores, BARC, Tarapur. Extreme care should be taken by the supplier to ensure safe delivery and to avoid scratches, dents during transportation.